

The Gutta Percha of the best and purest description free from all extraneous substances Gutta Percha. whatever.

The outer Iron Guard Wire, of No. 8, full guage measurement, manufactured of Swedish Iron, Guard Wire. (annealed), free from all defects whatever, such as cracks, brittleness, &c.

After the conducting wire has been well cleansed and pronounced free from all defects the first coating of Gutta Percha should be applied, after which it must be submerged in water for ten consecutive days in 20 mile lengths, the Insulation should then be well tested by the application of a powerful Galvanic Battery, and any defective portion discovered be immediately rejected. The second Gutta Percha coating should then be applied, and the same process repeated, a covering of tarred hemp yarn, &c., then laid on to the thickness of  $\frac{1}{8}$  of an inch. The outer Guard Wires to be firmly bound and the whole coated with the best Stockholm tar. All joints made in the wire must be carefully brightened. The Cable, in its entirety, should then be submerged in water for ten consecutive days, and the tests before mentioned again be applied. Insulation of Cable.

The above are the chief matters of importance with regard to the manufacture of Submarine Cables, of course the effectual performance of the conditions mentioned, and many other matters of detail must be entrusted to the Superintendence of some competent Engineer thoroughly conversant with such matters.

I send herewith a portion of the Tasmanian Cable for the inspection of the Government of New Zealand.

I see that Messrs. Silver & Co., of London, have recently been engaged in some interesting and valuable experiments, displaying the great advantages gained by substituting India Rubber for Gutta Percha as an Insulator in Submarine Cables. These experiments appear to have been most eminently successful, and have proved that the India Rubber coating is capable of withstanding great heat and pressure, in a measure far superior to Gutta Percha, and even at the highest prices of India Rubber it is found that Wires can be coated with that substance at little more than half the price charged for Gutta Percha. Some Wire thus coated was subjected in a Hydraulic Machine for a considerable time to a pressure of  $7\frac{1}{2}$  tons on the circular inch, and though tested in this state with one of Mr. Henley's very delicate Galvanometers, the insulation was found to be most perfect. The heat tests were equally successful, a considerable portion of Wire insulated with two coats of India Rubber was boiled in a large copper till the outside covering became almost white, the insulation still remaining perfect; Gutta Percha insulated Wire subjected in a like manner would be destroyed and rendered completely useless as an Insulator. New Insulation by Silver & Co. Silver's mode of Cable Insulation.

I should think therefore that the adoption of the India Rubber Insulation would be advisable in Cables destined for any of these Colonies having on the voyage out to encounter the great heat of the tropics, which is calculated to do much injury to some Cables, especially those portions packed close in Ship's holds; I believe it has been found necessary to cut out and entirely discard portions of Cables so stowed away, in consequence of the Copper Wire having pressed itself through the soft Gutta Percha covering, the Insulation of the entire Cable being rendered imperfect from this cause.

I merely draw the attention of the New Zealand Government to these matters in case these recent improvements should have escaped their observation.

The next question is "At what cost Land and Submarine Lines are maintained, and how the working expenses are provided for?"

Provision is made for the working of the Lines by sums voted by Parliament—

1st. Salaries of Officers.

2nd. Repairs, &c., to Line, Stationery, Stores, Fuel, and Light.

The Salaries of the Officers of the Department vary according to their several duties.

The Inspector of Telegraphs before the consolidation of his Office with that of Director of Public Works received £400 per annum. The salary of operators at chief Stations is £250 per annum. Clerks £200. Operators at Country Stations receive £150 per annum. Assistants £80 to £100. Town Messenger and Line Man £120 per annum. Country Messengers £50 per annum.

The reasons for difference in salary between those employed at Town and Country Stations will be obvious.

But these rates are those fixed when the Land Lines only were in operation, and when the hours of employment and general duties of all connected with the Lines were much less than at present, the completion of the Intercolonial Line will of course necessitate an alteration in excess of the rates which I mention, in consideration of the greatly extended duties of all employed.

I should estimate the cost of establishing a Telegraphic Station at from about £55 to £60, and the maintenance at from £30 to £50 per annum, but much depends on the position of the Station, whether intermediate or terminal, the latter being the most expensive. Cost establishing Stations. Cost of maintenance.

To work an important Telegraph Station efficiently, I think the following Staff would be requisite:—1 Chief Operator, 1 Assistant Operator, 1 Clerk, 1 or more Messengers as might be required. Staff required to work Station.

The attempt has been made to unite the duties of Clerk with those of Assistant Operator, but so far as Town Stations are concerned, I cannot say with good effect—for I have always found that one person's time was fully occupied in attending to the clerical duties of the Office entirely exclusive of operating, of course at Country Stations such consolidation is very advisable, indeed I think on Lines of any extent a saving might be effected in appointing the various Postmasters from the Telegraph Department (not *vice versa* unless under special circumstances) and I think the concentration of two Offices of so similar a nature would be found beneficial both to the convenience of the Public and the revenue derived from the Telegraph. Officers.